**Notebook Series -- Notebooks by Experimenters Other Than Edison**
**Phonograph Record Experiments -- Disc Plating Books**
**Notebook, N-14-05-28**

This notebook was used by William W. Dinwiddie in May and June 1914. At the beginning of the book are formulas for a silver solution, a reducing solution, and a washing solution; these formulas also appear in other books in this subgroup. Most of the entries describe experiments with "commercial" records or submasters washed with gold dust. The results and appearance are noted. There are occasional references to experiments by Moore, probably Sherwood T. (Sam) Moore. Also included is a list by Edison of suggested chemicals, with a notation that he will make additional suggestions if these do not work. The front cover is labeled "Silver Plating W. W. Dinwiddie May 1914." The book contains 28 numbered pages; some pages are blank.

# For silvering Mirrors



## Formic Aldehyde Process

**A**
Silver Solution

4000 cc Dist Water,
80 g. Silver Nitrate
(33 cc) strong Ammonia 26%
Ammonia added slowly to clear ~~[illegible]~~ then more Nitrate Silver solution (same strength) added a few drops at a time until solution is straw color.
Filter thru paper

**B**
Reducing Solution.

4000 cc Dist Water
150 cc Formic Aldehyde
~~(Filter thru paper)~~

No(1) see Page 23

**C**
Washing solution

3000 cc Dist water.
50 g stannous chloride
clear with ~~[illegible]~~ few drops HCl.

Wash or wet thoroly with C, rinse in distilled ~~[illegible]~~ water ~~A~~ - do not let dry — then pour together equal parts of A & B and pour immediately on surface to be silvered remove from solution before solution becomes muddy.

2

Commercial Record
washed with Gold Dust,
looks good one big star
The Chloride etc also

Commercial Record
washed with Gold Dust
150 cc Silver
150 cc Reducer + 5 cc Alcohol —
looks good - slite Yellow
Several small stars.

Same only 25 cc Alcohol
looks better.

3

Commercial Record
washed with Gold Dust
Chloride etc —
150 cc Silver
150 cc Reducer + 10 cc Glycerine
Several stars — Surface
covered with milky smear,
but a good coat

Commercial Record
washed as above
150 cc Silver
150 cc Reducer + 10 g. Sugar
Several stars but a
very beautiful white coat —

Commercial Record
washed same as preceding
20 cc alcohol
and 20 g. granulated sugar
added to reduce
Very Best Zy A

Commercial Record
washed in Gold Dust
rinsed in tap water
same as preceding
{ 20 cc Alcohol
{ 20 g granulated sugar
{ 5 drops nitric acid,
added to reducer —
Nitric acid makes reduction
much slower, but silver
is not so bright —

Same 10 drops Nitric acid
instead of 5 drops —
about same —



Commercial Record
same treatment except
10 drops of Acetic Acid
substituted for Nitric
very yellowish smeary
Clothing Coat of silver

Moons Experiment #49
silvered with formic aldehyde solution.
treated reg way with tinchloride
rinsed with 400 cc water + 3 cc ammonia —
see plating Exp Book page 16 —



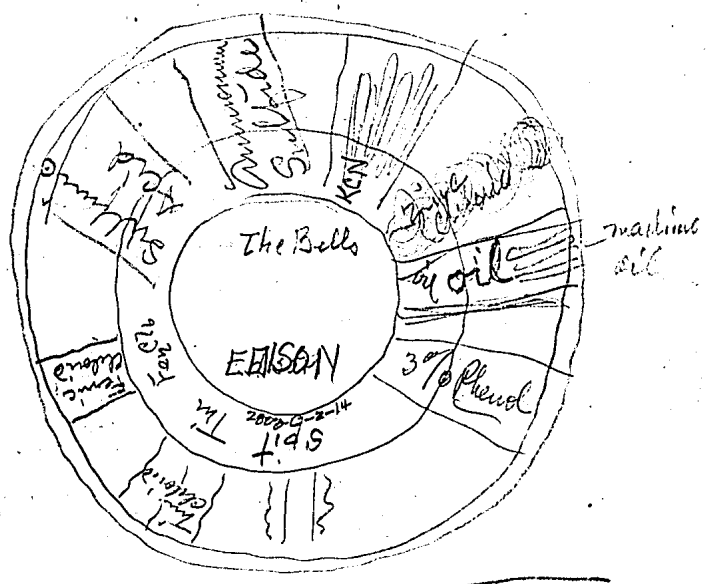
May 28-14
Moons Experiment #50
Sandmaite submaster —
washed in Cold Dist —
rinsed thoroly — tap water —
washed tin chloride solution —
washed in Dist water —
washed in Dist water — 400 cc ammonia 3 cc
Silvered face down 150 cc each solution —
put back in ammonia solution — then to bath —
Showed only one star — edge did not
plate good — not enough silver solution —
place on music near inside pulled
after plating 3 min — 1 - 3 amp.
plated very uniformly.

may 28

Moore Exp. No 54
Condensite Submaster
washed in "Gold Dust"
rinsed thoroly ~~tap water~~
washed in tin Chloride solution —
washed in dist water —
washed in 500 cc Dist water + 3 cc 26% Ammonia
washed again in ~~Dist~~ water —
silvered face down in 200 cc each solution.
washed thoroly in dist water & put in Cu bath —
Showed about 20 stars. — in silver
Cu. showed pin holes for each star.
plated very irregularly —
plated about 20 min — peeled in ribbons
on one side — removed from bath
~~Silvered~~ 2d time.
See plating Expt Book 2.



may 28 - 1914




~~Silvered same as Moore Expt #50~~
~~no trace of anything but~~ Ferric Chloride,
and this dried on and silver plated —
ammonia Sulfide shows a little

mg plating solution + 95% Alcohol ✓
+ granulated sugar ✓
+ glucose ✓
+ nitric acid ✓
+ Copper nitrate ✓
+ Acetone ✓
+ $H_2O_2$ ✓

✓ Glycerine
✓ Ethyl alcohol
✓ Methyl Alcohol.
Pyridin
✓ Phenol 1 or 2% sol.
✓ Glacial Acetic acid
✓ glucose
~~Alcohol~~
✓ Aniline Oil – 3% sol in Water

Water Soluble Dyes –
~~Ethanol~~

If none works we'll give list of many substances very sol in alcohol which will reduce speed of reaction probable



Bronze Experiment #58
Washed in "Gold Dust" solution
rinsed
washed in tin chloride,
washed in dist water,
washed in ammonia solution 3 cc to 400 cc
200 cc reducing solution + 10 drops $HNO_3$
200 cc Silver solution
Just touch in ammonia solution
rinsed in dist water – showed many small stars, but covered very uniformly in Copper bath –

Commercial records

May 29-14

1 { 150 cc reducing solution + 100 cc 95% alcohol
150 cc silver solution
backed same as preceding page Nerus Exp 58
fine coat silver, face down —
only one pin hole — v. clear solution

2 { same as above but + 25 cc Alcohol —
fine coat silver no holes — several spots

3 { same as (1) but ~~of~~ 10 cc Glycerine
several stains surface looks oneasy

4 { same as (1) but + 10 g granulated Sugar,
fine bright coat silver

5 { same as (1) but + 20 g Sugar and 20 cc 95% Alcohol
v. fine bright coat silver —



Small Discs, Celluloid —

{ 25 cc Silver + 25 cc Reducer + 1 drop $HNO_3$
v.v. clear solution slow reaction —
silver sticks v.v. tight.

{ same + 10 drops $HNO_3$ — no reduction of Silver.

{ Same + 6 drops $HNO_3$ — v. slow, v. clear
thin deposit —

{ Same as above + 1 g glucose — solution
turns dark brown very quick — then
black — plates muddy looking silver

{ Same as above + 2 cc of 3% Phenol
reduces v. quick solution turns dark
not regular —

{ Same as above + 5 cc peroxide hydrogen
Silver all oxidized no reduction

{ Same as above + 2 cc acetone — no effect

{ Same as above + 5 cc 1% solution "6-4"
no effect,
6-4 alone is $NaCl$, slite reduction
an acc. of the chloride.

May 30

25cc Silver
25cc Reducer + 1cc Copper Sulph. } no effect

25cc Silver
25cc Reducer + 200mg. Ammonium Bromid. } all silver drawn down in solution as silver bromid.

25cc Silver
25cc Reducer + Silicate Soda } turns light brown
V.V. thin deposit, F.A.
— try again —

25cc Silver
25cc Reducer } + 2cc Acetic Acid } V. slite reduction

25cc Silver
25cc Reducer + 3 drops Acetic Acid } V. slow reduction
turns dark —

25cc Silver
25cc Reducer + 1 drop Acetic Acid } action about same as $HNO_3$



June 1

Moore's Expt No 60.

Washed in Gold Dust Solution —
Rinsed in tap water
Washed in ~~the~~ Chloroid
Washed in (2) Dist. water
200cc reducing solution + 20cc 95% Alcohol + 20g. granulated sugar + 10 drops Nitric Acid.
200cc Silver solution.

fine coat — uniform — but several stars and very poor edge — would not wet.

Put in bath and would not plate on account of poor contact at edge —
cleaned with nitric acid just strong enough to attack silver and grafited.

Moorcó Sept 61
plated same as ~~no~~ 60 except that edge very well rubbed with tin chloride — edge plated better than 60 but poor. (9 stars)



June 7th

25cc Silver —
25cc Reducer + 20 drops Aniline Red Oil Solution
makes white precipitate in Reducer —

25cc Silver
25cc Reducer + 60 drops Aniline Red Oil Solution
makes white precipitate in Reducer —
(slite restrainer) — Silvers even —

25cc Silver
25cc Reducer + 5cc Blue Aniline Oil Solution
acts same as Red Aniline Oil but
more soluble —

25cc Silver
25cc Reducer + 4cc Blue Aniline Oil Solution
+ 8cc Alcohol — not so much white
precipitate which is soluble in alcohol
but solution darkened sooner —

25cc Silver
25cc Reducer + 5cc Absolute Wood
Alcohol — No effect —
plated irregular,

June 1 - 1914

washed in "Gold Dust"
rinsed in Tap. water -
washed in Alcohol
washed in Tin chloride.
washed in two dist. waters.
200 CC Silver
200 CC Reducer + 20 CC 95% Alcohol
+ 20 g. Sugar -
V. fine coat Silver
but has several stars.

Best yet



June 2 - 1914

Same treatment as next preceding except washed in Benzol instead of Alcohol and dist water instead of tap water, several stars

Same as above except, washed in Turpentine oil instead of Benzol,
several stars.

June 4 —
Used Pyrogalol instead of Tin chloride suggested by Aylsworth —
would not wet edges well U.G.,
showed stars v. bad.



June 4.
Made up Reducing solution (102)
2000 cc water
75 cc Formic Aldehyde
200 cc 95% Ethyl Alcohol
200 g. granulated Sugar
1 cc Nitric Acid

Used (Pyrogalol) with this reducing Solution — worse than with regular reducer. See page 1

Plates v. fine with the tin chloride wash. — use 20% more of this than of Silver solution.

washed with 95% Alcohol after tin chloride — looks fine —

washed with 1% Nitric acid then 95% Alcohol after tin chloride, looks fine

washed with 500 cc water + 25 cc 37% HCl after tin chloride — then 95% Alcohol —
Smeary — try again — may not be due to HCl.
All above have stars —

June 5

Moores Exp. 63 (wave all across)

Washed in Gold dust.
" " Dist water.
" " Tin Chloid.
" " 2 dist. waters —

{ 200 cc Silver Solution —
{ 240 cc reducing Solution (top of page 23)

Good coat of silver. several v. small stars —
corner not perfectly coated in copper —



June 5

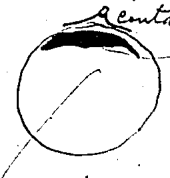
Moores Exp 65 —

Washed in Gold Dust —
" " Dist water —
" " Tin chloid.
" " Dist water
" " 95% Alcohol —
" " Dist water —

200 cc Silver Solution
240 cc reducing Solution (top of page 23)

— corner did not plate - where it is rounded off and did not receive pressure.

Washed in 95% alcohol —
wiped dry with new towel —
edge grafited — blown off




this area seemed to be anode and silver eaten off.

after plating for some time pulled at this place - never covered — copper plated on clip and edge - and on opposite side — this part seemed to be anode in feeding opposite side.

Started with too much current.

June 5

20 cc Silver
22 cc Reducer Page 23 + few drops
Potass Bichromate Solution,
Dipped precipitate
no Silver Reduced.

Same as above but with
Potass Chromate
Same reaction

20 cc Silver
22 cc Reducer + small amt Hydrazine
Sulfate —
Retards reduction
very much — tried twice

20 cc Silver
22 cc Reducer + 1 cc 5% solution
Ammonium Sulfate

20 cc Silver
22 cc Reducer + 1/4 cc 5% solution
Ammonium Sulfate

→ Best Retarder



June 5

200 cc Silver
240 cc Reducer + 5 cc 5% Solution
of Ammonium Sulfate

Very slow reduction
Silver bright — thin —
Solution poured off
perfectly clear —
Many Stars

Reducer No 3

2000 cc water
75 cc Formic Aldehyde
200 cc 95% - Ethyl Alcohol
200 g. granulated Sugar -
25 cc 5% Solution Ammonium Sulfate